**Sixth Grade: Mathematics**

**Unit #3: Using Fraction Operations**

**Formative Assessment Task – Assessment *FOR* Learning**

**Lesson Title: Snack Mix Fractions**

**Lesson Abstract:**

This lesson is intended to formatively assess students understanding of the concepts of fraction operations, primarily fraction division. This task also supports students in reflecting on and extending their knowledge of dividing fractions.

**Common Core State Standards:**

This lesson involves *mathematical content* in the standards from across the grades, with emphasis on:

6.NS Apply and extend previous understandings of multiplication and

division to divide fractions by fractions.

6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

**Intellectual Processes: (Standards for Mathematical Practices):**

This lesson involves a range of *mathematical practices,* with emphasis on:

* Reason abstractly and quantitatively: Solve problems within contexts that involve fraction operations.
* Construct viable arguments and critique the reasoning of others.
* Look for and make use of structure: Students understand the meaning of the numerator and the denominator.

**Instructional Resources**

* Each student will need:
* 2 copies of the assessment task *Snack Mix*

Each group will need:

* A large sheet of paper and a marker
* Copies of the Student Sample Responses

For the teacher:

* Projector slide of the task
* Projector slide of sample student responses

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| **Overview:** | |
| * Prior to using this lesson with students, work through the task and imagine all the ways you or your students might think to approach and solve the task. | This lesson is intended to be used after students have learned how to divide with fractions.   * The lesson is structured in the following way:   --Before the lesson, students attempt the assessment task individually (*Snack Mix)* that is intended to show their current understanding and difficulties with using fractions to answer a question.  --Review students’ work and formulate questions for students to use to improve their solutions.  --After a whole-class introduction, students are grouped and engage in a collaborative discussion on the same task. In their small groups students are also given sample solutions to analyze and evaluate.  --This is followed by a whole-class discussion in which students compare solutions and strategies that have been used.  --Last, students work individually to revise their solutions to the task, *Snack Mix,* using the strategies and ideas from the group activity. |
| **Give Task:** | |
| * A day before the lesson, give each student a copy of the *Snack Mix* task to complete individually*.* This will give you an opportunity to assess the work and to find out the kinds of difficulties students are having. You will then be able to target your help more effectively in the class part of the lesson. | * Introduce the task by explaining to your students:      * *You are going to receive a handout with a task on it.* * *Read through the task.* * *Spend about fifteen minutes working individually, answering the questions.* * *Make sure you answer each question as completely.* * It is important that students are allowed to work through the task without your assistance. * Students should not worry if they cannot understand or do everything because in the next part of this lesson they will engage with the task again in small groups, which should help them think about the mathematics needed. Explain to students that by the end of the next part of the lesson, they should expect to answer problems such as these confidently. This is the goal. |
| **Introducing the Lesson (Launch):** | |
| * **Prior to launching this task**, review students’ initial work from the Snack Mix task. Using data from the student work, formulate questions to present to the students to think about and use to improve their work. These questions should be open enough to reveal to students the areas of their work that they should reconsider but not hint as to the correct answer. A general list of questions can be written on the board at the start of the next part of the lesson for students to use with their group. One could also write specific questions on students’ individual papers that could be used when students are asked to revise their own work. * Avoid writing any scores on the students work, as this would distract them later when they return to the task to improve it. * Re-engaging with the task | * Begin the lesson by returning students’ individual work on the assessment task. Write your list of questions that you developed, based on students’ work, on the board for groups to use. * *I handed back your work on the* Snack Mix *task* (post copy of task using a projection devise)*. The name tells us that the task was about “snacks” but what was the task asking you to figure out? What mathematics was the task about?* * *I have read your solutions and I have some questions about the work posted on the board. I would like you to take a minute and do the following (post list below):*   *--review what you wrote*  *--review my questions on the board and select ones that seem to appropriate to what you did*  *--make any notes of how you might improve your solution.*   * Give students about 5 minutes to self-reflect. * Bring the class back together and explain to your class that they are going to re-engage with the task but this time in groups of 2 or 3. * Explain to students that they are going to have another go at the task with their group and they are to record the groups solution on the poster paper. * *I want you to work in groups to produce a solution that is better, more complete than your originals.* * *Share your individual work as a starting point for creating a better solution.* |
| **Explore (Collaborative work):** | |
| * The purpose of the collaboration is to allow students to re-engage with the task by explaining their thinking, making sense of their partners’ explanations, and coming up with a better, more complete solution. * Assign students to groups of two or three. * Give each group a large, piece of paper, and a marker * Groups write a solution for the *Snack Mix* task. | * Hold groups accountable for clearly explaining their ideas to each other by indicating that you will call on any member of the group to share the group’s solution, and all members need to be prepared to explain and answer questions from the class. * While students work in small groups you have two tasks: to note different student approaches to the task, and to support student problem solving   **Listen to students and note different student approaches to the task.**  Take note of unique strategies, areas of confusion, and misconceptions that you observe as you monitor students collaborative work. You can then use this information to focus a whole-class discussion during the next part of the lesson.  In particular, note any common mistakes. Consider things such as:   * Are students trying to use rules that they have learned through past experiences? If so, are they applying these rules appropriately? What is your evidence that the students understand these rules? * How are students making sense of unlike denominators? * Which solution strategies would be helpful for other students to consider? How do these strategies relate to one another?   **Support student problem solving.**  Try not to make suggestions that move students towards a particular approach for solving the task. Instead, ask questions that help students to clarify their thinking and or work. Focus on the strategies rather than the solution. If the whole-class is struggling on the same issue, you could write one or two relevant questions on the board, and hold a brief whole-class discussion in an effort to get the students to engage with the task and show what they can do, not to lead them to a particular approach or answer. Ask questions such as:   * *How are halves and fourths related?* * *How does your understanding of division/multiplication of whole numbers help you make sense of your answers and/or what the question is asking you to do?* * Drawing out student misconceptions and having students discuss them is an important part of the whole-class discussion. |
| **Collaborative analysis of *Sample Student Responses*** | |
| * This part of the lesson gives students the opportunity to evaluate a different approaches to the task and possible push their thinking and/or reconsider their solution. | * After groups have had enough time to complete the task, give each group copies of the two *Sample Student* *Responses*. Ask them to review each piece and use the questions on the bottom to analyze and evaluate the work. * *You are now going to look at two solutions to part of the task.* * *Review and discuss the work and answer the questions at the bottom of each paper:* * *Try to explain what the student has done.* * *Try to identify what mistakes have been made?* * *State what isn't clear about the work?* * Note similarities and differences between the approaches seen in the *Sample Responses* and those students took in the small-group work. Also, check to see which methods students have difficulties in understanding. This information can help you focus the next activity, a whole-class discussion. |
| **Summary (Whole class discussion):** | |
| * A class discussion is held on the sample students’ work. | * Have all groups post their solution to the task. * Hold a whole-class discussion and discuss the different approaches used in the sample work. Talk about part of the question the student work addresses (Question #1 and determining how many groups of raisins are available at the store) and what they have done. * *What part of the task are Dave and Lindsay addressing?* * *What has Dave done?* * *What errors has Dave made?* * *Is there anything that is not clear in Dave’s work?* * *Did any of the groups use Dave’s method as part of what they did to find the solution to the task?* * *What has Lindsay done?* * *What errors has Lindsay made?* * *Is there anything that is not clear in Lindsay’s work?* * *Did any of the groups use Lindsay’s method as part of what they did to find the solution to the task?* * *If you used Dave’s or Lindsay’s method correctly, to solve the problem, were you finished with the task when you got an answer from your drawing or computation? Why?* * *All of the groups’ work on the task is displayed. Is there anyone that has a question about any of the work the groups have posted?* |
| **Re-engagement (Independent work)** | |
| * Students are asked to revise their work on the initial assessment task, *Snack Mix,* and to use what they have learned from the lesson to revise their solution. | * Using a different color writing tool and writing on the original task paper—or—with a new copy of the task, ask studentsto re-visit and improve their solution on the *Snack Mix* task using the information they gained from their group and the sample work. * *Look at your original responses, and think about what you have learned in the group experience.* * *Using what you have learned, try to improve your work.* * If you find you are running out of time, then you could do the revision at the start of the next class or for homework. |
| **Solutions:**  To find out how many bags/groups of each ingredient are currently in the store, one needs to divide:  7÷ = 14 4 ÷ = 18 5÷ = 15 11÷ = 17  thus, 14 bags can be filled with the complete recipe.  Terrance should buy:  x 14 = 7 cups of soy nuts, x 14 = 3 cups of chocolate chips, x 14 = 5 cups of raisins, and x 14 = 9 cups of peanuts  Dave has drawn a model to help him think about how many groups of cups there are in 5cups He shows that each whole pound has two groups of and that cup also has two groups of but he made errors with the left in each whole.  Lindsay finds common denominators for her fractions. She then multiples 5 and 8, likely to find out how many eighths are in wholes and gets 40 but that is how many 1/8 there are and she needs groups of 3/8. She finishes by correctly dividing 6/8 by 3/8. | |